

REDESCRIPTION OF *METACLEOBIS FULVIPES* ROEWER FROM BRAZIL (SOLIFUGAE, MUMMUCIIDAE)

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ABSTRACT. The species *Metacleobis fulvipes* Roewer 1934 (Solifugae, Mummuciidae), previously known only from the male holotype, is redescribed based on the holotype and other male and female specimens. Illustrations of the main diagnostic characters are provided, and new occurrences of this species in Brazil are reported. Some behavioral observations of one individual kept in a terrarium are given.

RESUMO. A espécie *Metacleobis fulvipes* Roewer 1934 (Solifugae, Mummuciidae), conhecida previamente apenas pelo holótipo macho, é redescrita a partir do holótipo e de outros exemplares machos e fêmeas. Ilustrações dos principais caracteres são fornecidas e novas ocorrências da espécie no Brasil são registradas. São descritas observações comportamentais feitas a partir de um indivíduo mantido em terrário.

Keywords: Solifugae, Solpugida, Mummuciidae, taxonomy, Brazil

The geographic distribution, systematics and general biology of the South American Solifugae are poorly known. Research on Solifugae has been neglected by researchers, perhaps due to the difficulty in collecting these arachnids. Important studies on South American species have been done by Maury (1970, 1982, 1984, 1987, 1998) who published a series of papers on Solifugae systematics, with comments on their biogeography. In another important paper, Roewer (1934) described many species of Solifugae from the Neotropics, although most of them have very short and not very informative descriptions. This is the case with *Metacleobis fulvipes* Roewer 1934, in which the description is imprecise and based on a single male. Here, *Metacleobis fulvipes* is redescribed based on the holotype and on other male and female specimens, with comments on some behavioral aspects of one individual kept in a terrarium.

METHODS

The terms “bristles”, “setae” and “spines” are used according to Muma (1951). For instance, some of these structures bear a bifurcation at the tip and are called “bifid bristles”. Cheliceral teeth are also named according to Muma (1951), in which sizes of cheliceral

teeth are ordered with Roman numerals, size I being larger than II, and so on. The leg spination formulae are used as in Maury (1982) and the podomere terminology is used according to Shultz (1989). The term “ctenidia” is used as in Maury (1984).

Some telotarsi were cleared and stained according to Maury (1982), with the following modifications: the legs were placed in hot (near boiling) 1N NaOH solution, then transferred to Giemsa’s staining solution and washed in 80% ethanol to remove the excess stain.

We examined specimens from the following collections: Senckenberg Museum, Frankfurt, Germany (SMF); Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil (MZUSP); Museu de Ciências e Tecnologia da Pontifícia Universidade Católica do Rio Grande do Sul, Porto Alegre, Brazil (MCTP); Universidade Federal do Mato Grosso, Cuiabá, Brazil (UFMT).

Family Mummuciidae

Genus *Metacleobis* Roewer 1934

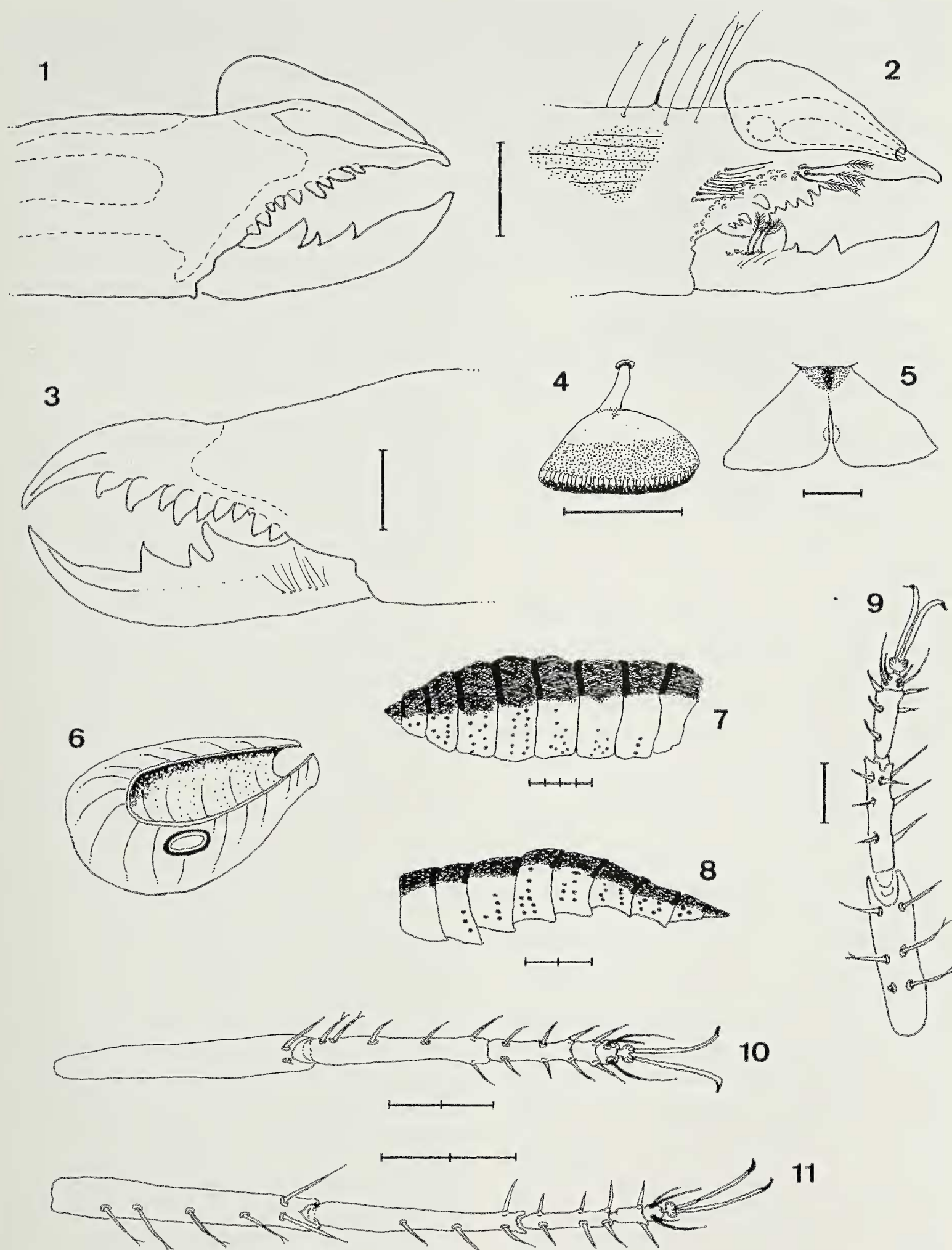
Metacleobis fulvipes Roewer 1934

Figs. 1–12

Metacleobis fulvipes Roewer 1934: 589–590, fig. 333c; Zilch, 1946: 150; Muma, 1976: 24; Maury, 1984:75, figs. 4–5.

Types examined.—Male holotype (SMF

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Figures 1-11.—*Metacleobis fulvipes*. 1. Right chelicera, ectal view, of male. 2. Left chelicera, mesal view, of male; only some of the plumose setae are depicted. 3. Left chelicera, ectal view, of female. 4. Left malleolus V of male holotype. 5. Genital operculum of female. 6. Schematic representation of right flagellum, showing the longitudinal lateral opening and the attaching ring, both in the ectal face. 7. Right pleurites of female; note the assembly of dark-brown sockets on the white portion of pleurites. 8. Left pleurites of male; 9. Left leg II of male. Note the bifid spines on the tibia (one is broken). 10. Left leg IV of female; note the bifid spines on the basitarsus. 11. Right leg IV of male; note the bifid spines on the tibia. Scale: each division = 0.50 mm.

4556), from Cuiabá, State of Mato Grosso, Brazil, (15°35'S, 56°05'W), C. Roewer coll. 1933.

Other material examined.—10♂ and 3♀ (MZUSP 15153, MZUSP 15154), from Serra da Mesa, State of Goiás, Brazil (14°17'09"S, 49°55'03"W), G. Skuk coll., 31 May 1996; 1♂ (MCTP 0002), A. Lise coll. 18 July 1992 and 1♀ UFMT, M. Carvalho coll. March 1996, both from Chapada dos Guimarães, State of Mato Grosso, Brazil (15°26'S, 55°45'W).

Diagnosis.—*Metacleobis fulvipes* is the only species of Mummuciidae with cheliceral dentition as depicted in Figs. 1–2 (males) and Fig. 3 (females).

Description of male.—Color in 80% ethanol: Prosoma: propeltidium brown with lighter regions at the anterior border, on each side of ocular tubercle and on two posterior-lateral areas. Eyes and ocular tubercle dark-brown. Peltidium white, posterior border dark-brown. Parapeltidium, mesopeltidia and metapeltidium similar to opisthosomal tergites. Chelicerae brown, with three longitudinal pale-brown stripes on ectal face joined dorsally above the fondal teeth. Pedipalps and legs brown, ventral face pale-brown. Malleoli pale-brown with distal region darker (Fig. 4), a color pattern more distinguishable in the two distal malleoli (IV and V). Opisthosoma: lateral borders of tergites white, one wide dark-brown stripe in the central half; this stripe is darker near posterior border of tergites. Brown bifid setae with brown sockets if in white area of the tergites, and white sockets if in the dark-brown area. Pleurites white (Fig. 8), dark-brown dorsal coloration occupying about one third of the width in the 5 proximal pleurites and almost half in the others. Pale-brown translucent bifid bristles on the white portion of pleurites with dark-brown sockets, arranged as in Fig. 8. Sternites pale brown, lateral borders brown. Vestitural bristles translucent pale-brown. Post-spiracular sternites 1–4 with about 25, 20, 10 and 5 brown spots, respectively, which include the sockets of some bifid bristles.

Morphology and chaetotaxy: Prosoma: propeltidium slightly wider than long, separated from lateral lobes by dorsal grooves and covered by short bristles and bifid setae. Ocular tubercle prominent with bifid setae oriented forward. Distance between the eyes slightly

wider than one eye diameter. Peltidium narrow, with a transverse row of bifid setae. Parapeltidium smooth. Mesopeltidium wider than long and semicircular with several bifid setae on posterior border. Metapeltidium wider than long with several bifid setae. Chelicerae: (Figs. 1 & 2) stridulatory apparatus in mesal face with six or eight parallel narrow grooves; ectal face bears several short bristles and several bifid setae; movable finger mesal face with some setae and plumose setae; dentition: one anterior, one intermediate and one principal tooth graded in size respectively II, III, I; fixed finger on mesal face with two rows of plumose setae parallel to the teeth and one smaller row of setae behind (Fig. 2); dentition: two anterior teeth, one intermediate and one principal tooth, graded in size from distal to proximal II, I, III, I (Fig. 1); five ectal fondal teeth, graded in size from distal to proximal I, II, III, II, II, or six teeth graded in size I, II, IV, II, II, III (the third distal may be vestigial); usually three mesal fondal teeth, graded in size from distal to proximal I, II, III, the first distal separated from others by a diastema, the most proximal (third) may be lacking or a fourth and smallest proximal mesal fondal tooth may be present. Flagellum thin (Figs. 1 & 6), translucent tear-drop-shaped vesicle, compressed and with a longitudinal ectal opening (in the face adjacent to the chelicera), which extends from near the base to tip of flagellum. Base of flagellum is a sclerotized ring placed posteriorly on ectal face. Flagella filled with a white viscous substance. Pedipalps with tarsi immovable, without spines, densely covered by differentially sized bifid bristles, with some very long setae on tibiae and patellae (about twice the length of pedipalpal patella). Legs (Figs. 9 & 11) with several differentially sized bifid bristles and some bifid setae. Some very long setae on the dorsal surfaces (about twice the length of leg IV basitarsus). Leg I thin, without telotarsal claws and spines. Legs II and III (Fig. 9): tibiae (spination formulae) with 1.1, 1.2, 2 or 2.2 ventral bifid spines and a distal pair of ventral spines; basitarsus with three retrolateral spines and 1.1.2 ventral spines; telotarsi two-segmented, 1.1.2/2.2 or 1.2.2/2.2 ventral spines. Leg IV (Fig. 11): tibiae with an anterior row of 1.1, 1.1.1, 1.1.1.1 or 1.1.1.1.1 ventral bifid spines and a distal pair of ventral spines; basitarsus with or without a proximal anterior row of 1.1

Table 1.—Morphometric characters of *Metacleobis fulvipes*. Measurements are in millimeters (except propeltidium length/width ratio) and were recorded as described in Muma (1951).

Morphometric character	Holotype	Males (n = 12)	Females (n = 4)
Total length	11.50	9.35–11.50	9.80–16.50
Cheliceral length	2.75	2.15–2.75	2.95–3.76
Cheliceral width	1.05	0.75–1.05	1.15–1.28
Propeltidium length	1.80	1.55–1.80	1.70–2.04
Propeltidium width	2.40	1.80–2.40	2.30–2.96
Propeltidium length/width ratio	0.75	0.82–0.75	0.74–0.69
Pedipalp length	6.75	6.00–7.00	5.75–7.10
Leg I	6.05	4.35–6.50	4.75–6.10
Leg IV	11.30	9.30–11.30	9.10–11.50

ventral bifid spines and with 1.1.2 or 1.1.1.2 ventral spines; telotarsi three-segmented, 2.2.2/2/1, 2.2.2/2/2 or 2.2.2/2/2.2 ventral spines. Spines of the distal tarsomere in legs II, III and IV are longer and thinner than the others. Malleoli as in Fig. 4. Opisthosoma: tergites wider than long, rounded borders, covered by several bifid bristles. Pleurites, 1–5 wider than long, 6–8 longer than wide. Sternites wider than long, densely covered by bifid bristles. Genital operculum with central longitudinal opening. Posterior border of post-spiracular sternite 2 with a row of about 50 ctenidia, thinner and more rigid than the sternite bifid bristles. Morphometric characters in Table 1.

Description of female.—Similar to male, but with the following differences.

Color in 80% ethanol: Opisthosomal pleurites with a pattern of dark-brown sockets arranged as in Fig. 7. Post-spiracular sternites without conspicuous brown spots.

Morphology and chaetotaxy: Prosoma: propeltidium wider than long. Bifid setae more abundant than in male. Eyes separated by three times one eye diameter. Chelicerae (Fig. 3): fixed finger with two anterior, one intermediate and one principal tooth, graded in size respectively II, I, III, I; five ectal fondal teeth graded in size from distal to proximal I, II, III, I, II or six graded I, II, III, IV, II, III and three mesal fondal teeth similar to male. Leg IV (Fig. 10): tibiae with an anterior row of 1.1 or 1.1.1.1 ventral bifid spines and a distal pair of ventral spines; basitarsus with a proximal anterior row of 1.1 ventral bifid spines and 1.1.2 or 1.1.1.2 ventral spines (Fig. 10); telotarsus with 2.2.2/2/2, 2.2.2/2/1.2 or

2.2.2/2/2.2 ventral spines. Opisthosoma: posterior border of post-spiracular sternite 2 with a row of about 50 ctenidia, thinner and more rigid than the sternite bifid bristles. Genital operculum prominent, fan-shaped, round-bordered, with central longitudinal opening (Fig. 5). Morphometric characters in Table 1.

Distribution.—*Metacleobis fulvipes* was described from Cuiabá, State of Mato Grosso, but the maps of geographic distribution of Solifugae published by Savory (1964) and Punzo (1998) do not mention the occurrence of this species. The new records of *Metacleobis fulvipes* are from Serra da Mesa, State of Goiás and Chapada dos Guimarães, State of Mato Grosso, both in Brazil.

Biological observations.—There are few papers describing the behavior of Solifugae. One of us (L.S.R.) maintained a female of *Metacleobis fulvipes* from Serra da Mesa (Fig. 12) for 81 days in 1996 in a glass box terrarium with dimensions (cm) 30 × 20 × 20 high. The substrate was sand with some surface plant leaves, small stones and pieces of wood. The specimen exhibited diurnal activities of walking and burrowing, and during the night, the specimen remained inactive under the same piece of wood. “Drowning” behavior was observed as described for some North American species by Muma (1967). The female was submerged in water for two hours and afterwards transferred to the terrarium. After drying, the specimen gradually recovered its normal mobility and activities. The specimen apparently exhibited some characteristics of “taming” (Muma 1966), since it survived for 81 days but never ate any items offered, i.e., termites, ants, small beetles and



Figure 12.—Photograph of a female of *Metacleobis fulvipes* maintained in a terrarium. Total length of the individual = 9.80 mm (Photograph by Dr. Ricardo Pinto-da-Rocha).

uncooked beef. Moreover, it did not show aggressive behavior against the living insects offered or against the manipulations of the observer.

DISCUSSION

The present redescription of *Metacleobis fulvipes* permits a more precise identification of this species based upon male and female specimens. The original description (Roewer 1934) was based on a single male, is very brief and provides imprecise information. For example, the holotype of *Metacleobis fulvipes* actually bears three mesal fonal teeth on the fixed cheliceral finger instead of two, as incorrectly depicted in Roewer's drawing (Roewer 1934, fig. 333c). An important character not mentioned by Roewer is the lateral opening placed in the ectal face of the flagellum. This opening is different from the opening found in the flagella of Ammotrechidae, which is located on the mesal face. Other systematic features of *M. fulvipes* such as pilosity, ctenidia, dark-brown sockets in opisthosomal pleurites, morphometric characters and female characters are newly described for this species.

Roewer (1934) relied heavily upon telotarsal spination patterns to segregate *Metacleobis* from other genera. However, this character system is a poor taxonomic discriminator and Maury (pers. comm., 1997, 1998) has sug-

gested to us that it is not possible to satisfactorily distinguish between the 10 named genera currently attributed to the Mummuciidae, and that a detailed systematic revision is needed to elucidate the relationships of the constituent taxa. Therefore, we have maintained the genus *Metacleobis* until such a review is undertaken.

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